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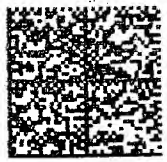
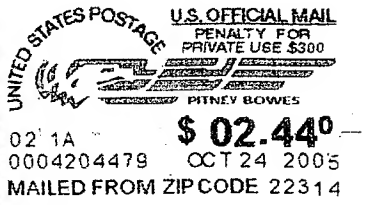
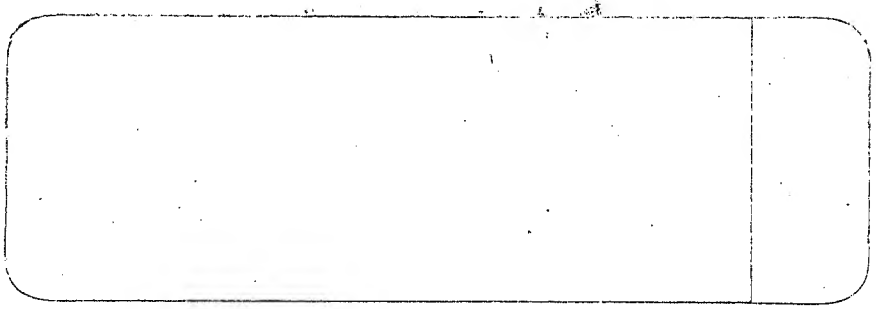
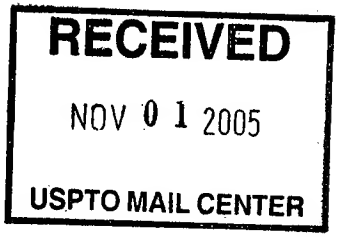




AN EQUAL OPPORTUNITY EMPLOYER





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NOTICE OF ALLOWANCE AND FEE(S) DUE

00826 7590 10/24/2005

ALSTON & BIRD LLP
BANK OF AMERICA PLAZA
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CHARLOTTE, NC 28280-4000

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EXAMINER	
POINVIL, FRANTZY	
ART UNIT	PAPER NUMBER
3628	

DATE MAILED: 10/24/2005

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
08/951,630	10/16/1997	ARLENE M VANCE	07099.0010-0	1804

TITLE OF INVENTION: SYSTEM FOR CORPORATE TRAVEL PLANNING AND MANAGEMENT

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1400	$0	$1400	01/24/2006

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE REFLECTS A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE APPLIED IN THIS APPLICATION. THE PTOL-85B (OR AN EQUIVALENT) MUST BE RETURNED WITHIN THIS PERIOD EVEN IF NO FEE IS DUE OR THE APPLICATION WILL BE REGARDED AS ABANDONED.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL should be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). Even if the fee(s) have already been paid, Part B - Fee(s) Transmittal should be completed and returned. If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PTOL-85 (Rev. 07/05) Approved for use through 04/30/2007.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

or Fax **(571) 273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

00826 7590 10/24/2005

ALSTON & BIRD LLP
BANK OF AMERICA PLAZA
101 SOUTH TRYON STREET, SUITE 4000
CHARLOTTE, NC 28280-4000

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
08/951,630	10/16/1997	ARLENE M VANCE	07099.0010-0	1804

TITLE OF INVENTION: SYSTEM FOR CORPORATE TRAVEL PLANNING AND MANAGEMENT

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1400	$0	$1400	01/24/2006

EXAMINER	ART UNIT	CLASS-SUBCLASS
POINVIL, FRANTZY	3628	705-005000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____

(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 _____ 3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are enclosed:

☐ Issue Fee

☐ Publication Fee (No small entity discount permitted)

☐ Advance Order - # of Copies _____

4b. Payment of Fee(s):

☐ A check in the amount of the fee(s) is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

☐ The Director is hereby authorized by charge the required fee(s), or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.

☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

The Director of the USPTO is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above.
NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
08/951,630	10/16/1997	ARLENE M VANCE	07099.0010-0	1804

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CHARLOTTE, NC 28280-4000

EXAMINER	
POINVIL, FRANTZY	
ART UNIT	PAPER NUMBER
3628	

DATE MAILED: 10/24/2005

Determination of Patent Term Extension under 35 U.S.C. 154 (b)
(application filed after June 7, 1995 but prior to May 29, 2000)

The Patent Term Extension is 0 day(s). Any patent to issue from the above-identified application will include an indication of the 0 day extension on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Extension is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571) 272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at (703) 305-8283.

PTOL-85 (Rev. 07/05) Approved for use through 04/30/2007.

OIPE JC56 MAR 24 2006 PATENT & TRADEMARK OFFICE

Substitute for form 1449/PTO (Revised 04/2003)				Complete if Known	
				Application Number	08/951,630
				Filing Date	10/16/1997
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				First Named Inventor	Arlene M. Vance
				Group Art Unit	3628
(Use as many sheets as necessary)				Examiner Name	Frantzy Poinvil
Sheet	*1*	of	*1*	Attorney Docket Number	047138-279826

OTHER DOCUMENTS			
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	English Language Translation Attached
FP	8	PAUL STEVEN ALEXANDER, *Statutory Declaration, In the Matter of Australian Patent No. 720671 in the name of Sabre, Inc. – and – In the Matter of opposition to grant by Amadeus Global Travel Distribution SA*, December 6, 2001	

Examiner Signature	FPoinvil	Date Considered	9/25/05

*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Notice of Allowability	Application No.	Applicant(s)	
	08/951,630	VANCE ET AL.	
	Examiner	Art Unit	
	Frantzy Poinvil	3628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *the response filed 3/24/2005*.

2. ☒ The allowed claim(s) is/are *99-113,166-214 and 216-222*.

3. ☒ The drawings filed on *16 October 1997* are accepted by the Examiner.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date 3/24/2005
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

FRANTZY POINVIL
PRIMARY EXAMINER
AU 3628

Examiner-Initiated Interview Summary	Application No.	Applicant(s)	
	08/951,630	VANCE ET AL.	
	Examiner	Art Unit	
	Frantzy Poinvil	3628	

All Participants:

(1) *Frantzy Poinvil*.

(2) *Guy R. Gosnell*.

Status of Application: _____

(3) _____.

(4) _____.

Date of Interview: *11 July 2005*

Time: _____

Type of Interview:
- ☒ Telephonic
- ☐ Video Conference
- ☐ Personal (Copy given to: ☐ Applicant ☐ Applicant's representative)

Exhibit Shown or Demonstrated: ☐ Yes ☒ No
If Yes, provide a brief description:

Part I.

Rejection(s) discussed:
None

Claims discussed:
99-113, 166-214 and 216-222

Prior art documents discussed:
NONE

Part II.

SUBSTANCE OF INTERVIEW DESCRIBING THE GENERAL NATURE OF WHAT WAS DISCUSSED:
See the attached Examiner's Amendment.

Part III.

☐ It is not necessary for applicant to provide a separate record of the substance of the interview, since the interview directly resulted in the allowance of the application. The examiner will provide a written summary of the substance of the interview in the Notice of Allowability.

☐ It is not necessary for applicant to provide a separate record of the substance of the interview, since the interview did not result in resolution of all issues. A brief summary by the examiner appears in Part II above.

(Examiner/SPE Signature) (Applicant/Applicant's Representative Signature – if appropriate)

DETAILED ACTION

Allowable Subject Matter

1. The following is an examiner's statement of reasons for allowance:

The prior art taken alone or in combination failed to teach or suggest displaying a calendar showing at least one month divided into days with at least to icons on days associated with the new travel reservation, wherein the icons represent components on the travel reservation are selected from the group comprising a transportation component, a lodging component, and a car rental component as recited in independent claim 99.

The prior art taken alone or in combination failed to teach or suggest automatically calculating a travel end date for the new travel reservation based on the selected frequent trip record and the indicate new travel date, and including the travel end date in the information transmitted to the computerized reservation system as recited in independent claim 198.

The prior art taken alone or in combination failed to teach or suggest automatically calculating the travel end date for the new travel itinerary based on the displayed past travel itinerary and the identified new travel start date, and including the calculated travel end date in the new travel itinerary transmitted through the interactive reservation system as recited in independent claim 213.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Ahlstrom et al, (WO89/0778) discloses a travel management system.

Brison, discloses an article entitled "Agentless' Means 'Costs Less' ".

Ahlstrom et al and Brison taken alone or in combination failed to teach or suggest the above noted features found in claims 99, 198 and 213.

Conclusion

2. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Frantzy Poinvil whose telephone number is (571) 272-6797. The examiner can normally be reached on Monday-Thursday 7:00AM-5:30PM.

The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9326 for Before Final actions and (703) 872-9327 for After Final.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1113.

FP
September 12, 2005

Fr... ...
AU 3628

Notice of References Cited	Application/Control No. 08/951,630	Applicant(s)/Patent Under Reexamination VANCE ET AL.	
	Examiner Frantzy Poinvil	Art Unit 3628	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-			
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N	WO 89/07798	08-1989	WIPO	AHLSTROM et al.	---
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	Mary Brisson, " 'Agentless' Means 'Costs Less' ", Business Travel News, p14, August 8, 1994, Dialog file 16, Accession No. 03503684.
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

DIALOG(R)File 16:Gale Group PROMT(R)
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03503684 Supplier Number: 44903968 (THIS IS THE FULLTEXT)
'Agentless' Means 'Costs Less'
Business Travel News, p14
August 8, 1994
ISSN: 8750-3670
Language: English Record Type: Fulltext
Document Type: Tabloid; Trade
Word Count: 1485
TEXT:
BY MARY BRISSON

Caught in a crosscurrent between sinking commissions and rising transactions, many travel agency executives say the lifeline they are reaching for is a digital wire to their corporate accounts.

Their hope is to use computer communications to pull free of some of the labor costs that weigh them down. They hope, through electronic messaging, to shift some of the work of making reservations to their customers, and to cut the unproductive time their agents spend on the phone.

Often their accounts have parallel aims: to save on agent labor costs that come out of their revenue share, and to trim the time corporate employees spend making travel arrangements.

And yet today, almost four years since World Wide Travel Service of Little Rock, Ark., released the first electronic mail-based booking program, such technology is not yet in widespread use. It has been slow going because of technical barriers as well as behavioral ones. And while observers say progress is accelerating, they also say it will be some time - years, probably - before computer communications change agency-client relations in a broad way.

When a travel agency uses electronic communication today, most often it's to send an itinerary from a CRS workstation to a client for review. Frequently, the reservation system automatically sends an itinerary by fax, not via e -mail.

Less commonly, some agencies are linked with their clients to receive reservation requests electronically; an agent still does the work of making the booking. Less frequently still, a fully automated program converts the request message into a confirmed reservation without an agent's involvement.

It's that so-called 'agentless' process that offers significant savings to travel agencies and, by extension, their customers, said Michael Whitesage, president of the Prism Group in Albuquerque, N.M. 'That's where the money is,' he said. 'The cost is that person.'

Still, there are relatively few products in the market that fully automate the process. Among them are Rosenbluth International's E-Res, with about 12 corporate installations, and Sabre Travel Information Network's SabrExpress, with about 30 agencies marketing the program to their corporate accounts.

SabrExpress, like World Wide's Quality Agent, can accept reservation messages via e-mail or fax - and the usage patterns for those products point to one reason electronic applications are not yet widely used. That is, although the number of corporations that use e-mail or electronic messaging is growing fast, there's still relatively few that use such technology extensively enough to make it the standard mode for a function as common as travel reservations.

Sabre estimated that about half of SabrExpress' corporate users are communicating with the program by fax, and World Wide said most of its 40 Quality Agent accounts use its fax option instead of e-mail. At Rosenbluth,

only 5 percent of corporate accounts have complete e-mail environments, said David Miller, vice president of Information Technology.

Even where the right pieces are in place, travelers often remain reluctant to entrust their arrangements to a computer, World Wide has discovered. Although some clients do up to half of their bookings without agent involvement, overall the average is closer to 10 percent, said Kelly Carney, vice president of quality management services.

'The other 90 percent use the program for schedules and queries and fares,' said Carney. 'Then they call their favorite travel agent and talk about the news of the day. They love knowing their options. They love feeling they're in control. But they still don't want to take the responsibility for making a booking.'

Also, built into e-mail is a technical hitch that has snagged some development efforts. E-mail is designed to let users store messages and send them later, as well as pick up messages in batches occasionally. If a corporate account wants a program automatically to make a reservation without first showing a traveler any options, then an e-mail message works fine to initiate that transaction.

But if the corporation wants to let its travelers make final choices for themselves, the process gets more complicated: During the lag between the time a CRS sends a list of flight options and the time a traveler picks up the menu and sends back a decision, some options easily can become unavailable.

Designing a link with a client then becomes a matter of weighing the frequency of message exchanges against the resulting communication costs, noted Larry Janiga, management information systems director at Total Travel Management. The Troy, Mich., agency is working on an agentless program, and in the meantime is rolling out an e-mail package to let clients send requests to agent workstations.

This timing problem, coupled with the realization that most clients weren't ready for e-mail, was a factor in Carlson Wagonlit's decision last fall to stop marketing its Rapid Rez program. Upon announcing the product in November 1992, the agency planned that Rapid Rez initially would screen a traveler's request against availability and corporate policy and then pass a record to an agent to complete, and that shortly it would be able to handle simple itineraries without intervention.

But now, a year and a half later, Matthew Manley, vice president and chief technology officer for the Carlson Travel Group, said, 'I am not aware of any environment that does that satisfactorily on a large scale.' Carlson Wagonlit instead is developing a PC program intended to let users interact live with a CRS. Some other programs, such as WorldTravel Partners' RezAssist, also are designed for direct, real-time interaction with reservation systems, in preference to e-mail.

There also are technical obstacles to efforts by corporations and their agencies to develop electronic links that stop short of fully automated booking programs but still offer the prospect of improved efficiency, such as the exchange of e-mail messages for reservation requests and itineraries.

'Given the variety of gremlins that live between systems,' said Andy Cameron, vice president of product management and automation at McCord Travel in Chicago, 'it's much more difficult to do than to identify as a strategy.' Set-up costs can cancel out any savings from productivity improvements, he said.

Still, there have been advances in the past year, according to Linda Mann, assistant vice president of software development at Thomas Cook Travel. Recent e-mail software releases are easier to interconnect, she said, and they have features that make them easier to use.

Additionally, said Mann, companies increasingly are completing the transition from mainframes to networked personal computers that are more likely to be functionally compatible with agency systems. And more

companies with e-mail software are upgrading it to handle forms instead of only free-form messages - a key advantage for reservation packages.

Mann said Thomas Cook is working on twice as many e-mail projects with clients as it was a year ago, and the pace is picking up.

Helping matters along are those corporations that have been able to spend resources to develop automated travel applications. 'They will be the frontierspeople others can learn from,' said Robert Langsfeld, the San Diego -based consultant.

Some of those pioneering companies are coordinating efforts in order to fund different facets of software development projects and then take advantage of the sum of the results. In one case, two of a developer's clients changed their proprietary specifications to industry standards to enable the creation of a product that will be widely marketable. 'There's more teamwork going on,' observed Langsfeld.

Despite the hurdles, travel agency executives still are motivated powerfully to automate as much of the reservation process as is practical. 'It's a major strategy for us,' said Frank Dinovo, president of Travel and Transport.

The Omaha, Neb., agency is developing an e-mail-based agentless application, as well as one to let clients make bookings over a public data network. Currently $15 million of its $300 million annual volume results from reservations requested via e-mail by corporate clients. Noting that labor typically accounts for half of an agency's costs, Dinovo said, 'If agencies don't pursue this approach, I don't see how they can stay in business in the next three-to-five years.'

More than any technical obstacle, Dinovo and other agency executives sense their biggest challenge is going to be changing people's habits so that they become as comfortable with computers as they are with agents for arranging travel.

'It's going to boil down to the timing of the work-force transition in Corporate America,' said Manley, looking forward to the time when the current generation of computer-literate college graduates grows to critical mass among business travelers.

To nudge evolution along, agencies soon may begin to offer financial incentives to get clients to use automated booking tools. As fee-based pricing becomes more common, an agency may charge one price for a ticket issued from a computer booking, and a higher price to clients who use the phone. Others plan to factor the difference into traditional formulas.

'If a customer wants a lot of revenue sharing and doesn't want to make these changes,' said Dinovo, 'there's not much future in that relationship.'

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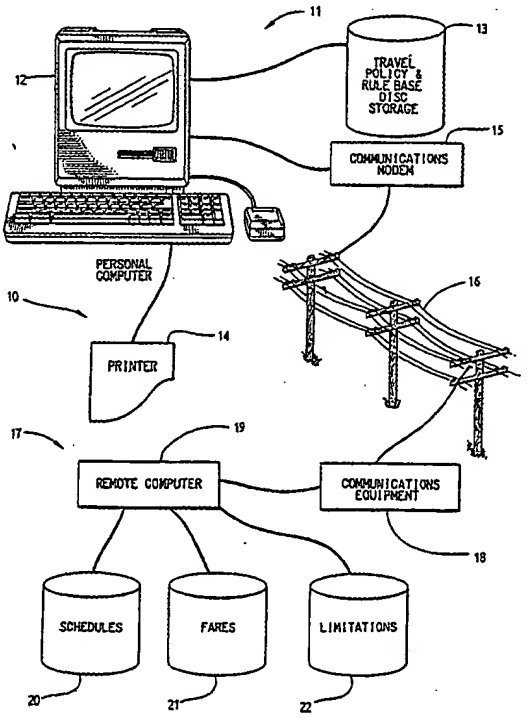
(57) Abstract

A remote data base (13) containing flight schedule and fare information is accessed from a local computer terminal (12). Limitations on the applicability of the fare information are inferred from a locally stored expert rule base. A locally stored travel policy can be applied to the retrieved information to select a plurality of potentially preferred flight/fare alternatives. The flight/fare alternatives are displayed for selection of a preferred itinerary.



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TRAVEL MANAGEMENT SYSTEM

Technical Field

This invention relates to data processing methodology and apparatus for accessing flight scheduling, fare, and fare limitations information, and sorting and scoring selected flight schedules and fares from the accessed information in accordance with a predetermined travel policy. In particular, it pertains to such a system that derives fare limitations and combinability of separate flight and fare alternatives into a flight itinerary through the application of an expert rule base to standard fare basis codes.

Background Art

Deregulation of the airline industry has resulted in the proliferation of varied flight schedules and fares, each with its own particular set of eligibility requirements. Electronic data base services have assisted in the dissemination of flight schedule and fare information, but the effectiveness of such data availability has been limited by its own unmanageable volume.

U.S. Patent Application Serial No. 008,223, assigned to the assignee of the present invention and incorporated herein by reference, describes a system that can access flight scheduling and fare information, and automatically apply a predetermined travel policy to select a preferred travel itinerary from the accessed information. The system

described in the '223 application obtains flight data from a compendium of flight schedule and fare information, such as the Official Airline Guide, Electronic Edition, maintained by the Official Airline Guides, Inc. of 2000 Clearwater Drive, Oak Drive, Illinois 60521, and reads flight scheduling information and fare information directly from the compendium's data base. Fare limitation information (such as advance purchase requirements) is also read directly from the compendium's data base. Fare limitation information is displayed from such data bases in plain English form, and the system described in the '223 patent application discloses a means for parsing and processing the plain English limitation information.

Flight information compendiums, such as the Official Airline Guide, Electronic Edition, are maintained as an information service only. As such, the information they include is limited to the information most likely to be used in the most common travel circumstances. Computer-reservation systems, such as the System One Computer Reservation System, maintained by System One, Inc., Houston, Texas, are the systems actually used by the airlines in maintaining and using their flight schedule, fare, and fare limitations information. Accordingly, a travel management system capable of accessing a computer reservation system, rather than a compendium of such information, would have an expanded capability for the selection of preferred travel itineraries.

Computer reservation systems present fare limitation information in plain English language, just as is done in flight information compendiums. The extensive quantity of fare limitation information contained in computer reservation systems, however, makes it impractical to process such information by parsing and processing the plain English. A travel management system that could take advantage of all of the fare limitation information stored on a computer reservation system fare limitation data base,

while reducing the time required to process such information, would be a decided advantage.

Summary of the Invention

The travel management system disclosed herein provides a method for reading and storing the flight schedule, fare, and fare limitations information maintained on a remote computer reservation system for processing in accordance with a predetermined travel policy. The invention takes advantage of the particular structure and organization in which flight schedule, flight fare, and fare limitations information are maintained within computer reservation systems to reduce processing time.

Flight schedule/availability, flight fare, and fare limitation information are maintained in separate data bases within computer reservation systems. Flight schedule/availability information includes the dates and times which flights are scheduled to depart and arrive specified origination and destination points, and the availability of seating on the flight by fare class. Flight fare information includes the fare amount, a fare basis code, information as to whether the fare is for a one way or a round trip, and certain limited information concerning the applicability of the fare. Complete fare limitation information is maintained in a separate data base and is presented in plain English. The present invention precludes the necessity of querying the fare limitations data base each time the system is used to select a preferred travel itinerary, through the use of an expert rule base that infers the fare limitations from the fare basis codes maintained in the fare data base. Valuable processing time is saved by inferring fare limitations from the fare basis codes, rather than directly accessing the fare limitations data base.

The present invention also includes a unique way for determining whether flight/fare alternatives for any

segment of a trip can be combined with flight/fare alternatives for the other segments of a trip. Maintenance tools are provided for keeping the expert rule base current.

Brief Description of the Drawings

Fig. 1 is a schematic view of the system in accordance with the present invention.

Fig. 2 is a flow chart depicting the overall operation of the present invention.

Fig. 3 is a flow chart depicting in greater detail the read information step 28 of Fig. 2.

Fig. 4 is a flow chart depicting in greater detail the evaluate fares step 46 of Fig. 3.

Figs. 5a and 5b combine to present is a flow chart depicting in greater detail the analyze fare code step 62 of Figure 4.

Figs. 6a, 6b, 6c, and 6d combine to present a flow chart depicting in greater detail the display results and selection step 30 of Figure 2.

Figs. 7a and 7b combine to form a flow chart depicting a maintenance tool for the expert rule base employed by the invention.

Detailed Description of the Drawings

Referring to the drawings, a system for accessing and processing remotely stored flight travel data 10 includes a locally operated computer system 11 having terminal 12, memory storage disk 13, printer 14, and communications modem 15. Modem 15 is connected via telecommunication lines 16 to a remotely maintained computer system 17. The computer system 17 includes communications interface equipment 18, and computer 19. The remote computer system is preferably a travel reservation system such as that used by major airlines for processing schedule, fare, and

reservation information, and includes a flight schedule/availability data base 20, fare data base 21, and fare limitations data base 22. While the system is shown in conjunction with a remote computer system, it will be understood that the analyzing, sorting, and scoring functions of the system could be applied to locally stored flight information.

Referring to Fig. 2, operation of the system 10, in its broadest sense, is depicted in flow chart form. The operator of the system 10 inputs a travel origin and a final destination for each segment of a travel itinerary, and the time the travel will occur, at the local computer terminal, step 24. The operator next presses a connect key, step 26, thereby establishing a connection between the local computer system 11 and the remote computer system 17. Flight scheduling information, fare information, and flight fare limitation information stored in the remote computer system data base can be read by the local computer system 11, step 28. (As will be explained in detail below, an expert rule based stored at the local computer system 11 precludes the need to access the fare limitations data base each time the travel management system is used.) Once requested information is received from the remote computer system 17, the information is analyzed, scored, and sorted in accordance with the expert rule base and travel policy information stored on disk storage 13, step 30. The operator can select displayed results, and combine flight/fare alternatives recommended by the travel policy software to create a selected travel itinerary, step 32.

The read information function of step 28 of Fig. 2 is set forth in greater detail in Fig. 3. The type of trip (i.e., one way, round trip, circle trip) is determined at step 34 from the data input by the operator at step 24. The trip type information is later used in evaluating the data retrieved from the remote data base. Test 36 determines whether there are segments of the trip to

process. In that regard, it will be appreciated that a trip is comprised of one or more segments, each segment representing a city pair consisting of an origin city and a destination city. For purposes of test 36, processing consists of obtaining flight schedule and fare information for each trip segment. If no segments have been entered by the operator, program flow is returned from test 36 to step 24, Fig. 2 where the operator is prompted to input travel origin and destination points. When all trip segments have been processed, program flow is directed to step 30, where information on the trip segments is analyzed and sorted. If there are segments to be processed, program flow is directed to step 38, where scheduling data comprising a listing of flights between cities of each respective trip segment, for the travel times requested, is obtained from the flight schedule data base 20.

Scheduling data can be obtained for a specified range of departure times or arrival times, and the range of time can be expanded if no flights are found in the initially specified range. Co-pending U.S. Patent Application Serial Number 008,223 describes a method for obtaining scheduling data, based on an expanding range of departure or arrival times, that can be employed at step 38.

Once all of the scheduling information available for a given segment has been obtained, program flow is directed to test 40, to determine if any scheduled flights have been found for the trip segment and times under consideration. If there are no flights, program flow is directed to block 36 to determine whether there are additional trip segments to process. (Similarly,if there are flights, program flow is returned to step 36 once fare data has been obtained for all such flights.) If the scheduling data recovered from the remote data base reveals there are flights scheduled for the trip segment and times requested, program flow is directed to step 42 for recovery of fare data from the remote data base for each of the flights

found. It will be appreciated that a single flight will have multiple fares available (i.e., first class, coach class, advanced purchase, etc.), such that a plurality of fare alternatives will be applicable to a single flight, thereby providing a plurality of flight/fare alternatives. The fare data obtained from the fare data base 21 includes the flight fare code, fare amount, information as to whether the fare is a one-way or round trip fare, and limited information concerning applicability restrictions on the fare code.

Program flow is next directed to test 44 for processing of the fare data recovered from the remote data base for each scheduled flight under consideration. If all fares for the scheduled flight under consideration have been processed, program flow is returned to step 40 to determine whether there are additional scheduled flights for the trip segment under consideration for which fare data is required.

Each fare of each flight retrieved from the remote data base represents a flight/fare alternative that may be applicable to the trip segment under consideration. Whether or not a flight/fare alternative is a viable travel option for the given trip segment is determined by directing program flow to step 46, the evaluate-fares step. The fare evaluation process of step 46 is set out in detail in Figs. 4 and 5.

The fare evaluation process begins at test 48 for a determination of whether the fare under consideration is a round-trip or one-way fare. If the fare under consideration is a round trip fare, program flow is directed to test 50 where it is determined whether round trip fares should be considered based upon the trip type determination made in step 34. If the trip type was determined in step 34 to be other than a one-way trip, program flow is directed to step 54, otherwise program flow is directed to the next available fare line. If the fare

under consideration is not a round trip fare, program flow is directed to test 52 where it is determined whether enough one way fares have already been reviewed to make inquiries on further one way fares redundant. If further one way fares are to be considered, program flow is directed to step 54, otherwise program flow is returned to step 44 to determine whether there are additional flight/fare alternatives to consider.

It will be recalled that certain limited data concerning applicability of restrictions on a fare code are presented with the fare data from the remote fare data base. The limited data is separate from, and a subset of, the complete applicability limitations data that is presented in plain English from the remote data base limitations file 22. Step 54 evaluates the limited applicability information that is retrieved from the fares data base in order to determine the preliminary applicability of the fare. For instance, the fare data may indicate that the fare is valid only for a certain day, or that advance purchase must be made a certain number of days in advance of the flight. If the travel plans under consideration are not for the day the fare is valid, or if advance purchase requirements cannot be met, the flight/fare alternative would be inapplicable. If it is determined at step 54 that limitations contained in the fare data make the flight/fare alternative under consideration inapplicable, the flight/fare alternative under consideration is rejected, and program flow is returned to step 44 for consideration of the next flight/fare alternative.

Program flow is directed from step 56 to the analyze fare code step 62, if the flight/fare alternative under consideration is for the appropriate round-trip or one-way type, and if the applicable restrictions within the fare data do not preclude further consideration of the flight/fare alternatives.

The analyze fare code step 62 determines whether there are any limitations on the applicability of the flight/fare alternative under consideration, by application of an expert rule base to the fare code obtained from the fare data base 21 in step 44. Fare limitation information is obtained from the expert rule base rather than accessing the fare limitations data base 22 to directly derive the fare limitations.

The expert rule base is premised on the relationship between fare codes and fare applicability limitations. Fare codes consist of from up to 12 alphanumeric characters. Through accepted industry usage, certain fare code patterns are predominantly associated with the same limitations on the applicability of the fare. (For instance, the characters "AP14" in the fare code MAP14 always indicate that the ticket must be purchased 14 days before the flight departure date).

The airline industry has developed several hundreds of variations of limitations on the applicability of fares. Examples of limitations commonly used are advance purchase requirements, requirements to travel on specific days or specific times, and penalties assessed for cancelling the flight reservation. The expert rule base employed at step 62 is able to infer which of the hundreds of possibilities of fare limitations apply to a given flight/fare alternative. As its input, the rule base considers six factors derived from the system user, and from the schedules data base 20 and fares data base 21 of the remote computer system. The factors include the departure airport, the arrival airport, the carrier, the fare direction (either outbound or inbound), open jaw travel direction (travel that does not depend on air travel for each segment of the trip is known in the industry as "open jaw" travel), and the fare basis code.

Each of the rules in the expert rule base considers each of the above mentioned input variables, and the rule

applies to the flight/fare alternative under consideration if the input variables match the requirements of the rule. For instance, the rule may indicate that travel on certain days at certain times is required for the fare to be applicable. If the input variables of the rule are met the limitations inferred by the rule may be attached to the flight/fare alternative under consideration. Alternatively, the limitations inferred from the rule can be analyzed to determine whether the flight/fare alternative can be immediately disqualified from further consideration.

Referring to Figure 5, execution of the rule base is initialized by setting the output of the rule base to NULL and setting a pointer to the first rule in the rule base. Program flow is directed to test 66 for one-at-a-time selection of the rules for consideration. Each rule for which all input variables are met will be activated, and the action specified by the rule will be executed. For instance, the fare limitations reflected in the rule will be attached to the flight/fare alternative under consideration if the requirements of the rule so indicate. When all rules in the rule base have been considered for the fare in question, program flow is returned to test 60, Fig. 4.

Tests 68-80 consider each of the rule input requirements one-at-a-time to determine whether a particular rule will be activated. Test 68 determines whether the depart city condition of the rule matches the depart city for the flight/fare alternative under consideration. If the depart city condition of the rule is not satisfied, program flow is directed to test 66 for consideration of the next rule in the rule base. If the depart city condition of the rule is satisfied, program flow is directed to test 70 where it is determined whether the arrive city condition of the flight/fare alternative matches the arrive city condition of the rule. If the

arrive city condition is not met, program flow is returned to test 66 for consideration of the next rule. Program flow is directed in a similar manner to tests 72, 74 and 76 for a determination of whether the carrier, the fare direction, and open jaw travel direction conditions of the flight/fare alternative under consideration are met.

Rather than requiring an exact match as an input condition to a rule, the match fare code patterns step 77 analyzes the fare code with a standard pattern matching technique (such as a GREP-style pattern matching method) for the occurrence of recognizable patterns. For instance, if the patter AP14 is found anywhere in a fare code (such as QAP14NR), a rule can be activated indicating an advance purchase requirement applies to the flight/fare alternative under consideration.

If no pattern is found between the fare code under consideration and the rule in question, program flow is directed to step 66 by test 78 for consideration of the next rule. If a pattern is found, program flow is directed to step 79 for marking of the characters used in the pattern matching. In that regard, it will be appreciated that specific alpha-numeric characters can present different meanings depending on the pattern they appear in. Once specific characters have been determined to appear in a given pattern, they can be marked at step 79 so that they will not be reanalyzed as being in a different pattern. The rules can be ordered within the rule base so that the first pattern which a character is identified as belonging to will be the correct pattern for that character.

Program flow is next directed to step 80, where predetermined variable information can be extracted from the fare code. For example, the pattern "AP" within a fare code always indicates that an advance purchase requirement pertains, with numeric characters indicating the number of days required for the advanced purchase (i.e., AP14 would require an advance purchase of 14 days). Rather than have

a separate rule for each advance purchase requirement (i.e., AP7, AP14, etc.), the variable data pertaining to the number of days can be recovered from the fare code under consideration.

Program flow is next directed to test 82 where the actions required by the rule are addressed one at a time. Actions required by a rule may include attachment of a limitation to the flight/fare alternative under consideration. Alternatively, the action may indicate that subsequent rules in the rule base may be skipped over if the rule under consideration applies, or the limitations inferred by a rule may be analyzed immediately to disqualify a flight/fare alternative.

Program flow is directed to step 84, where the variable data recovered at step 80, if any, is inserted into the rule. Program flow is directed to step 86, where the action is executed. Test 87 determines whether the flight/fare alternative can be immediately disqualified because of the limitation implied by the rule, and returns program flow to step 44 for consideration of the next fare, if the flight/fare alternative is so eliminated.

Once all of the rules in the rule base have been examined for the fare in question, program flow is returned to test 60, Fig. 4. Test 60 considers availability information to determine whether there are seats available for the fare in question. If there are available seats, the fare data is saved in step 61, and program flow is directed to test 44 to consider the next fare. If no seats are available, the fare is discarded and program flow is directed to test 44 for consideration of the next fare.

Once each of the flight/fare alternatives is ascertained from the remote data base, communications with the remote data base can be terminated.

Very often, the most economical flight/fare alternative for a given segment of a trip is a round trip fare. A round trip fare in one segment may be used,

however, only if it is combinable with at least one flight/fare alternative in every other segment of the trip. Fare basis codes fall into one or more combinability categories. Associated with each fare basis code is a list of combinability tokens indicating the combinability categories into which the fare basis code falls. Fare basis codes must share at least one combinability token in order to be combinable with each other. Combinability rules contained in the expert rule base assign combinability tokens to each flight/fare alternative under consideration depending upon the combinability categories into which the fare basis codes fall. In order to recommend a travel itinerary which takes advantage of round trip fares, the system must determine whether there are combinability tokens that are common to at least one flight/fare alternative in each segment of the trip.

Figs. 6-8 depict the display and selection step 32 in greater detail. At step 88, the system compiles a list of all unique combinability tokens associated with fare basis codes in the first segment. The system takes the first combinability token from the list (step 90) and in step 92 compiles a list of all fare basis codes in other segments which share the same combinability token. Program flow is directed to test 94 where the system determines whether there is at least one fare code from each segment which shares the same combinability token. If the combinability token is not common to at least one fare code in each segment of the trip, the combinability token is removed from each fare code in each segment with which it is associated (step 96), and program flow is directed to test 100 to determine whether there are additional combinability tokens in the list of unique combinability tokens. If the combinability token is shared by at least one fare basis code in each segment, the fare basis code is marked as acceptable and program flow is directed to test 100 to determine whether there are more combinability

tokens to consider. Once all combinability tokens have been considered, program flow is directed to step 102 where all fare basis codes not found to be acceptable are removed from the list of fares to be considered for selection. In step 104 the system recompiles a list of all unique combinability tokens in segment one which were found to be combinable with other trip segments. In step 106 the system then removes any combinability tokens in other segments which are not contained in the list compiled in step 104. The system then scores the flight/fare alternatives at step 30 to determine which of the available flight/fare alternatives found is the most desirable. U.S. Patent Application Serial No. 008,223, referred to above, describes a method for scoring the flight/fare alternatives that can be employed at step 30.

Program flow is next directed to step 108 where each combinability token is retrieved from the list of unique combinability tokens compiled in step 104, Fig. 5. The system aggregates the scores of the highest scoring flight/fare alternative in each segment which uses the retrieved combinability token (step 110) and compares the aggregate score for the combination under consideration to the aggregate score of the highest scoring combination previously considered by the system. The aggregate score and associated combinability token for the highest scoring combination as yet considered by the system is retained in step 112. Program flow is directed to test 114 where it is determined whether each entry in the list of unique combinability tokens has been considered by the system. As long as there are entries yet to be considered in the list of unique combinability tokens, program flow is directed to step 108 for consideration of the next combinability token, otherwise program flow is directed to step 116.

Steps 116, 118 and 120 describe the format in which recommended flight/fare alternatives are displayed to the user. The flight/fare alternatives from each segment which

combined to produce the highest aggregate score are displayed on the terminal screen in inverse video, and the status of those flight/fare alternatives is set to "selected," step 116. Remaining flight/fare alternatives which share the associated combinability rule pointer with the selected flight/fare alternatives are displayed on the terminal screen as highlighted, and the status of those flight/fare alternatives is set to "combinable," step 118. In step 120, the status of all other flight/fare alternatives is set to "non-combinable," i.e., flights which are not combinable with the currently selected flight/fare alternative. Non-combinable flight/fare alternatives are displayed on the screen as low lighted.

Program flow is directed to test 122, Fig. 7 where the flight/fare alternative selection process takes place. Currently selected, combinable and non-combinable flight/fare alternatives are displayed for each segment. As mentioned above, selected flight/fare alternatives are displayed in inverse video, combinable flight/fare alternatives are displayed as highlighted, and non-combinable flight/fare alternatives are displayed as low lighted. If the user chooses flight/fare alternatives which have been initially selected by the system, the selection process is complete, otherwise, program flow is directed to test 124. Test 124 determines whether the user has selected a flight/fare alternative which is currently combinable. If the user selects a currently combinable flight/fare alternative the status of the currently selected flight/fare alternative is changed to "combinable," and that alternative is displayed on the screen as highlighted, step 126. Program flow is directed to step 128 where the status of the combinable flight/fare alternative is changed to "selected," and the selected flight/fare alternative is displayed on the screen in inverse video, and the selection process is complete.

If the user selects a flight/fare alternative which is currently non-combinable (i.e., not combinable with flight/fare alternatives selected by the system), program flow is directed by test 124 to step 130 where the system issues a warning message that selection of the flight/fare alternative in question may change the selected and combinable flight/fare alternatives in other segments of the trip. Program flow is directed to test 132 where the system determines whether the user actually wishes to select the non-combinable flight/fare alternative. If the user decides not to select the flight/fare alternative in question, the selection process is complete, otherwise program flow is directed to step 134.

In step 134, the status of the selected flight/fare alternative is changed from "non-combinable" to "selected," and the selected flight/fare alternative is displayed on the screen in inverse video. In steps 136-150 the system redetermines the combinable and non-combinable status at the displayed flight/fare alternatives by determining which flight/fare alternatives in other segments are combinable with the flight/fare alternative selected by the user. A list of combinability tokens associated with the selected flight/fare alternative is compiled of step 136. Program flow is directed to step 138 where the system retrieves a combinability token from the list of tokens compiled in step 136. The system aggregates the scores of the highest scoring flight/fare alternative in each segment which uses the retrieved combinability token (step 140). Program flow is directed to step 142 where the aggregate score for the combination under consideration is compared to the aggregate score for the highest scoring combination previously considered by the system. The aggregate score and associated combinability token for the highest scoring combination as yet considered by the system are retained in step 142. Program flow is directed by test 144 to step 138 if there are more combinability tokens to consider,

otherwise program flow is directed by test 144 to step 146. In step 146, the status of the flight/fare alternatives which combined to produce the highest aggregate score is set to "selected," and the selected flight/fare alternatives are displayed on the screen in inverse video. Program flow is directed to step 148 where the status of flight/fare alternatives which share the associated combinability token with the selected flight/fare alternatives are displayed on the screen as highlighted, and the status of those flight/fare alternatives is set to "combinable". Program flow is directed to step 150 where the status of all other flight/fare alternatives is set to "non-combinable," and the non-combinable flight/fare alternatives are displayed on the screen as low lighted.

Fig. 9 and Fig. 10 combine to depict a maintenance tool for the rule base wherein all the fare limitations data and fare codes for a selected market or markets are compared with the rule base to determine whether all fare codes, and their limitations, in the market are addressed by the rule base. The list of markets to be considered may be randomly generated by the system from a file of city codes, or may be supplied by the user. The system examines the first market to be considered, step 152. Program flow is directed to step 154 where the system queries the host schedules data base 20 for all airlines serving the market under consideration. Program flow is directed to step 156 where the system queries the host fare data base 21 for all fare codes used by the airlines serving the market under consideration. Program flow is directed to step 158 where the system determines from the host fare limitations data base 22 all rules that apply to each flight/fare code alternative within the market under consideration. In step 160, the system extracts advance purchase data, booking class, combinability rule pointers and day/time restrictions for each flight/fare code alternative. The information derived in steps 154-160 is written to a file

in step 162 for consideration at step 166. Program flow is directed to test 164 where the system determines whether there are additional markets to process. If there are additional markets to process, program flow is directed to step 152 where fare code information concerning the next market is obtained.

When all markets have been considered, program flow is directed by test 164 to step 166 where a line of information from the input file created at the step 162 is read by the system. Program flow is directed to step 168 where the airline, market and fare code from the line of information under consideration are passed to the fare code analyzer routine, steps 62-86. The fare limitations determined to be applicable by the fare code analyzer routine are compared to the actual limitation information contained in the input file, step 170, and any discrepancies are written to appropriate output files depending upon the type of limitation involved. In this manner, the system is able to identify fare codes which are not correctly analyzed by the rule base, so that appropriate modifications to the rule base can be made.

Program flow is directed to test 174 where the system determines whether there is another line of data in the input file to process. If there are more data lines to process, program flow is directed to step 166 for consideration of the next flight/fare code alternative. Once all data in the output file has been processed, program flow is directed to block 176 where information concerning the new fare codes encountered by the system is written to a log file. The log file contains such information as the airline, fare code, the first date on which the fare code was encountered by the system and the last date on which the fare code was encountered by the system.

We claim:

1. A method for determining travel itineraries from a travel data base having separate schedule, fare, and fare limitations data files, comprising the steps of:

compiling an expert rule base having a plurality of rules, the rules in the rule base pertaining to fare limitations maintained in said fare limitations data file and having predetermined individual activation criteria;

retrieving data on scheduled flights from said schedule data file for a desired travel time to obtain available scheduled flights between a selected origin and destination points;

retrieving fare data from said fare data file for each of said available scheduled flights to present at least one flight/fare alternative; and

comparing the fare data for said flight/fare alternative against the individual activation criteria of each of said rules to determine whether the fare limitations of each of said rules are applicable to said flight/fare alternative, whereby the applicability of said flight/fare alternative is determined without accessing said fare limitations data file.

2. The invention as claimed in claim 1, said fare data including fare codes and said activation criteria including fare code criteria, said step of comparing said fare data against said activation criteria of each of said rules including the step of comparing said fare codes for said flight/fare alternative against said fare code criteria.

3. The invention as claimed in claim 2, said

fare code comprising an alpha numeric code word, said step of comparing said fare codes for said flight/fare alternative against said fare code criteria including the step of analyzing the alpha numeric code word with a pattern matching technique.

4. The invention as claimed in claim 1, including the step of periodically updating the expert rule base by retrieving fare limitations data from said fare limitations data files and comparing the rules of the rule base to the fare limitations data.

5. A method for displaying a plurality of scheduled flight/fare alternatives for the travel segments of a round trip travel itinerary comprising the steps of:

simultaneously displaying at least some of said flight/fare alternatives;

visually distinguishing the preferred flight/fare alternative for each travel segment of said travel itinerary from the remaining of said flight/fare alternatives;

determining which of said remaining flight/fare alternatives are combinable with said preferred flight/fare alternatives to create a round trip travel itinerary;

visually distinguishing said combinable remaining flight/fare alternatives from said preferred flight/fare alternatives and the remaining flight/fare alternatives that are not combinable with said preferred flight/fare alternatives.

6. The invention as claimed in claim 5, including the step of determining the preferred flight/fare alternative in accordance with a predetermined travel policy.

7. The invention as claimed in claim 6, includ-

ing the step of overriding said predetermined travel policy and selecting one of said flight/fare alternatives as the preferred flight/fare alternative.

Fig. 1

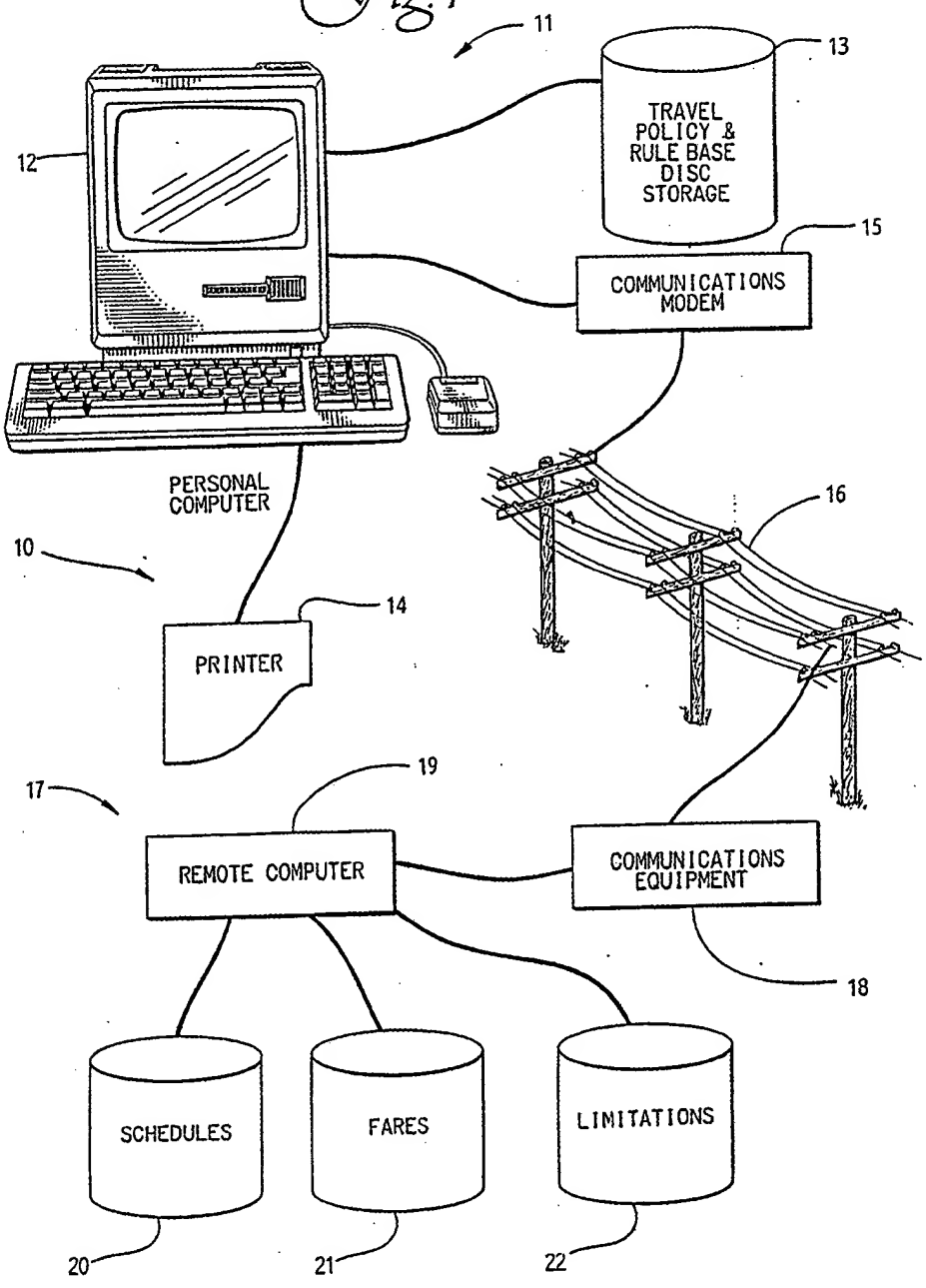

11
13
TRAVEL POLICY & RULE BASE DISC STORAGE
12
15
COMMUNICATIONS MODEM
PERSONAL COMPUTER
16
10
14
PRINTER
17
19
REMOTE COMPUTER
COMMUNICATIONS EQUIPMENT
18
SCHEDULES
FARES
LIMITATIONS
20
21
22

Fig. 2

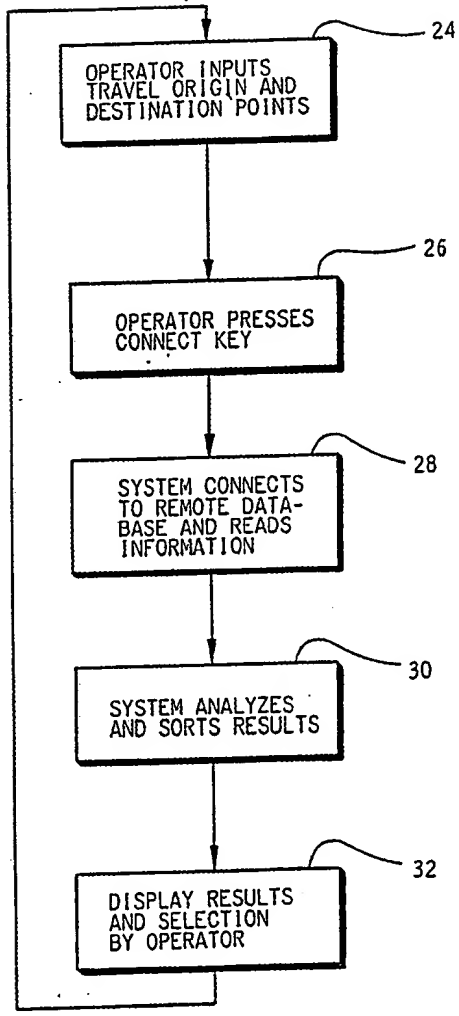

24
OPERATOR INPUTS TRAVEL ORIGIN AND DESTINATION POINTS
26
OPERATOR PRESSES CONNECT KEY
28
SYSTEM CONNECTS TO REMOTE DATA-BASE AND READS INFORMATION
30
SYSTEM ANALYZES AND SORTS RESULTS
32
DISPLAY RESULTS AND SELECTION BY OPERATOR

Fig 3

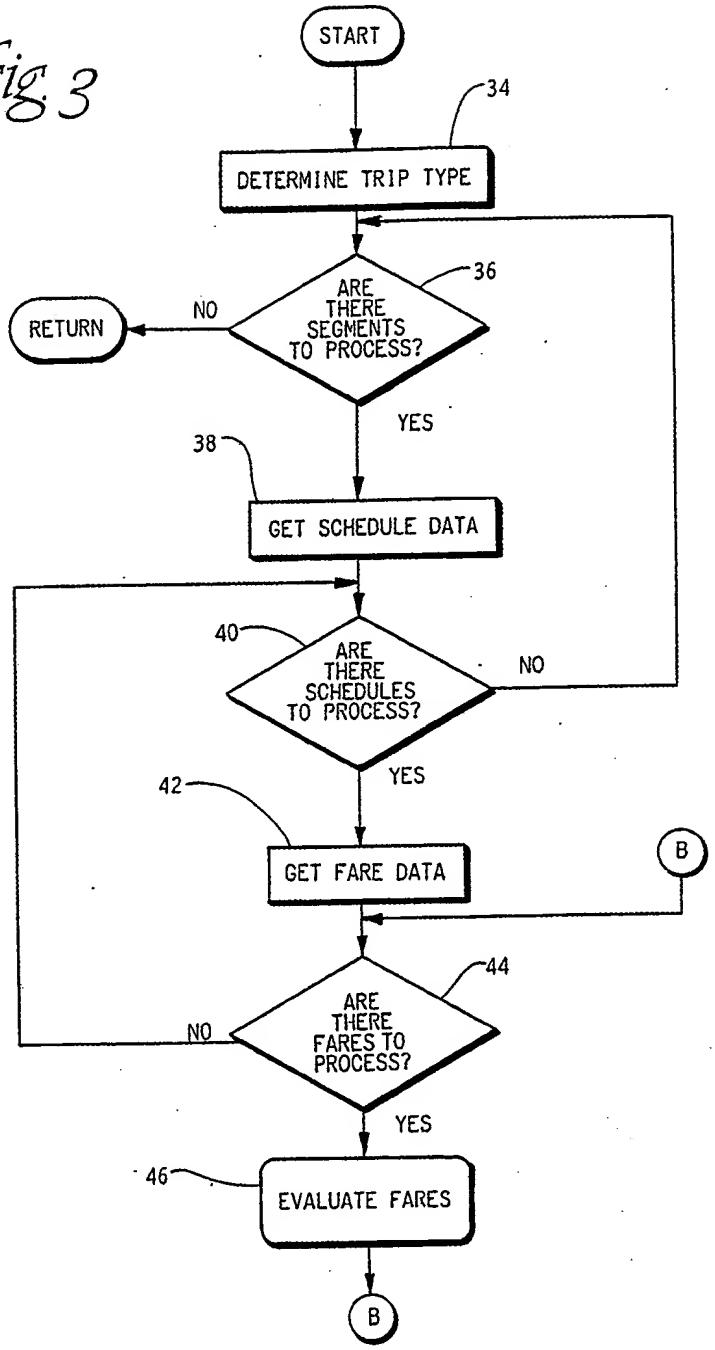
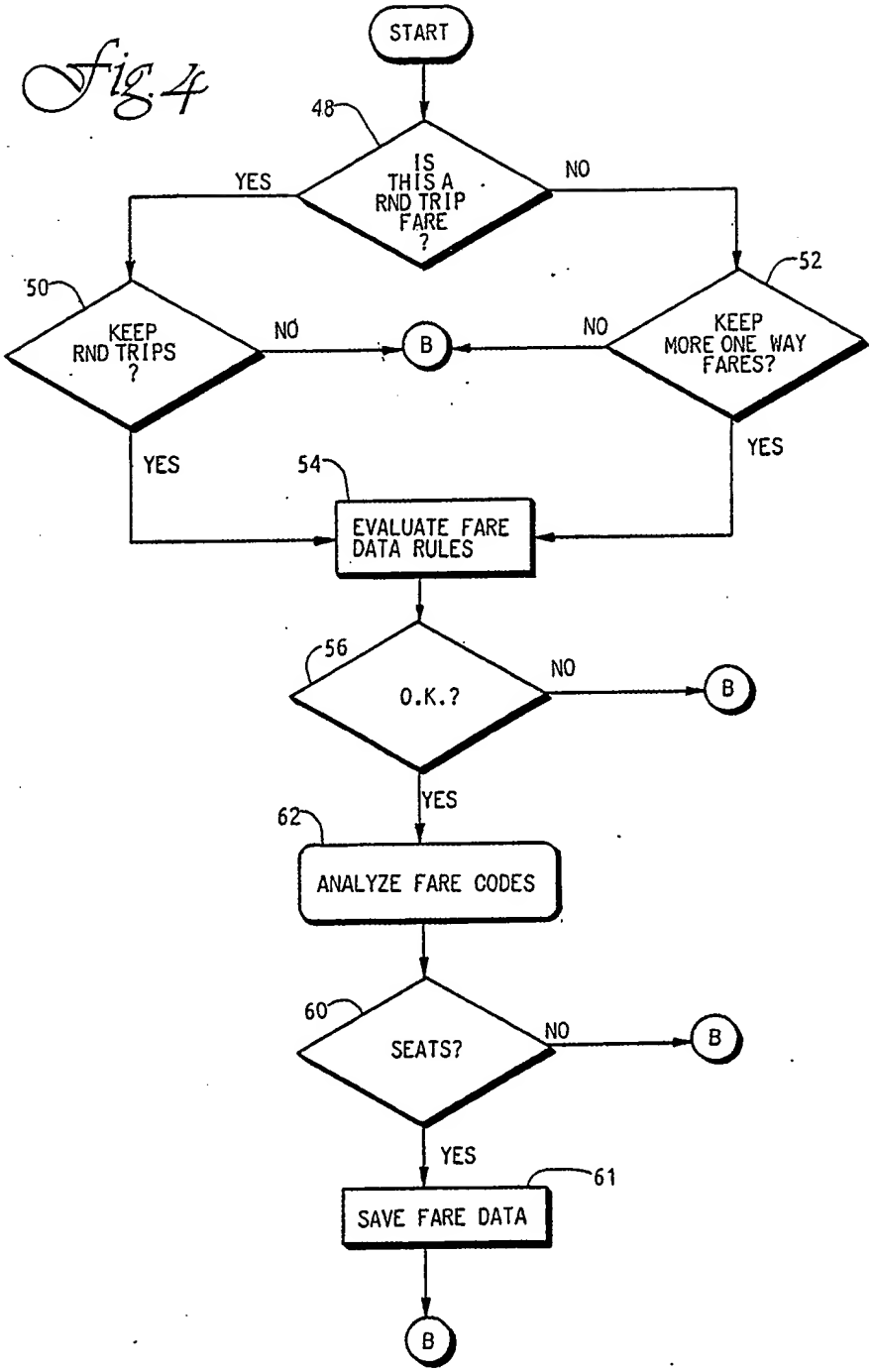

START
34
DETERMINE TRIP TYPE
36
ARE THERE SEGMENTS TO PROCESS?
NO
RETURN
YES
38
GET SCHEDULE DATA
40
ARE THERE SCHEDULES TO PROCESS?
NO
YES
42
GET FARE DATA
B
44
ARE THERE FARES TO PROCESS?
NO
YES
46
EVALUATE FARES
B

Fig. 4


START
48
IS THIS A RND TRIP FARE ?
YES
NO
50
KEEP RND TRIPS ?
NO
B
NO
52
KEEP MORE ONE WAY FARES?
YES
YES
54
EVALUATE FARE DATA RULES
56
O.K.?
NO
B
YES
62
ANALYZE FARE CODES
60
SEATS?
NO
B
YES
61
SAVE FARE DATA
B

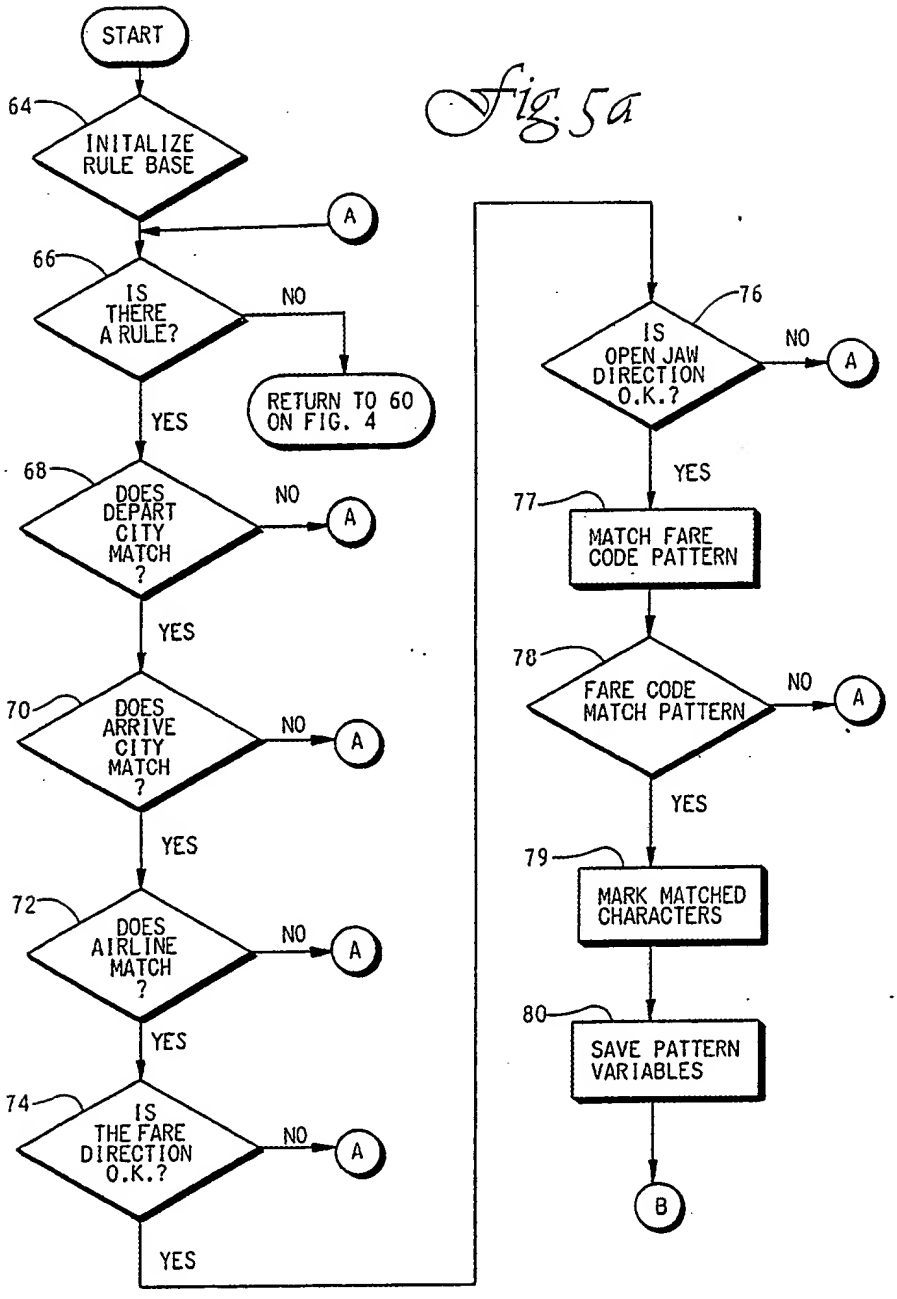

START
64
INITALIZE RULE BASE
A
66
IS THERE A RULE?
NO
RETURN TO 60 ON FIG. 4
YES
68
DOES DEPART CITY MATCH ?
NO
A
YES
70
DOES ARRIVE CITY MATCH ?
NO
A
YES
72
DOES AIRLINE MATCH ?
NO
A
YES
74
IS THE FARE DIRECTION O.K.?
NO
A
YES
76
IS OPEN JAW DIRECTION O.K.?
NO
A
YES
77
MATCH FARE CODE PATTERN
78
FARE CODE MATCH PATTERN
NO
A
YES
79
MARK MATCHED CHARACTERS
80
SAVE PATTERN VARIABLES
B

Fig. 5a

Fig. 5b

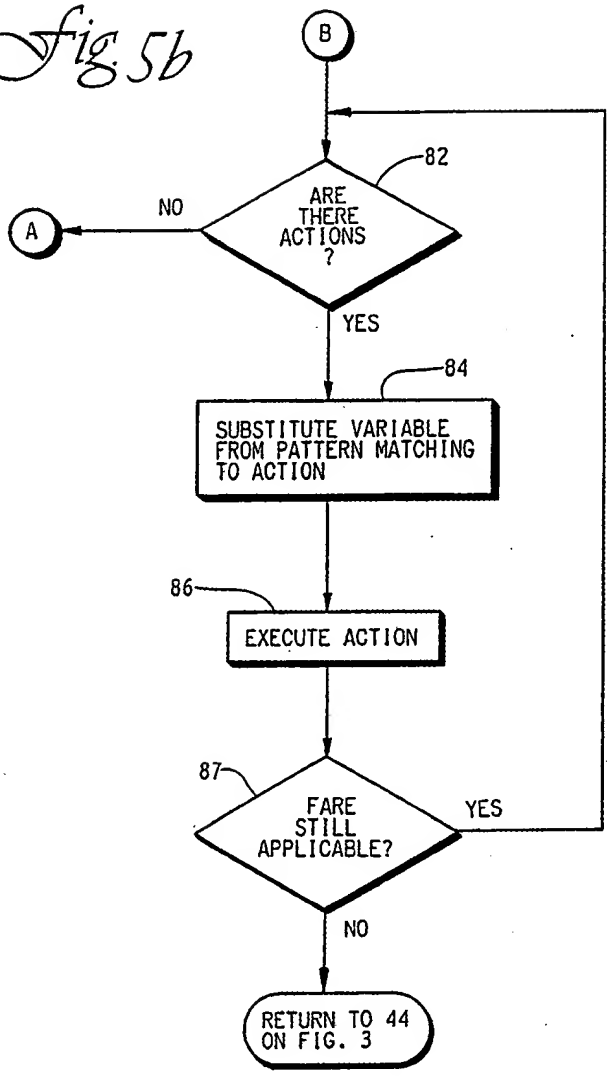

B
82
ARE THERE ACTIONS ?
NO
A
YES
84
SUBSTITUTE VARIABLE FROM PATTERN MATCHING TO ACTION
86
EXECUTE ACTION
87
FARE STILL APPLICABLE?
YES
NO
RETURN TO 44 ON FIG. 3

Fig. 6

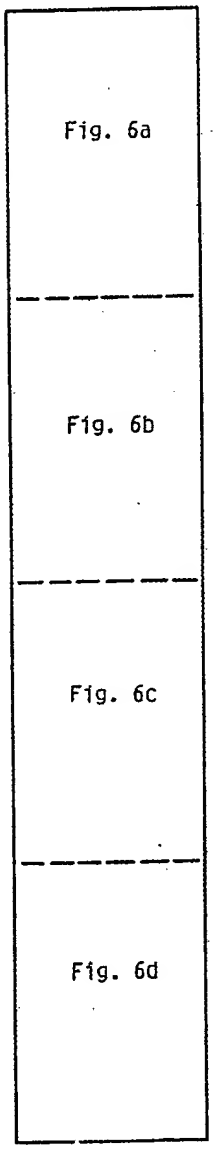


Fig. 7

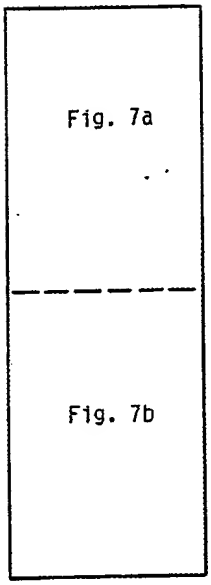


Fig 6a

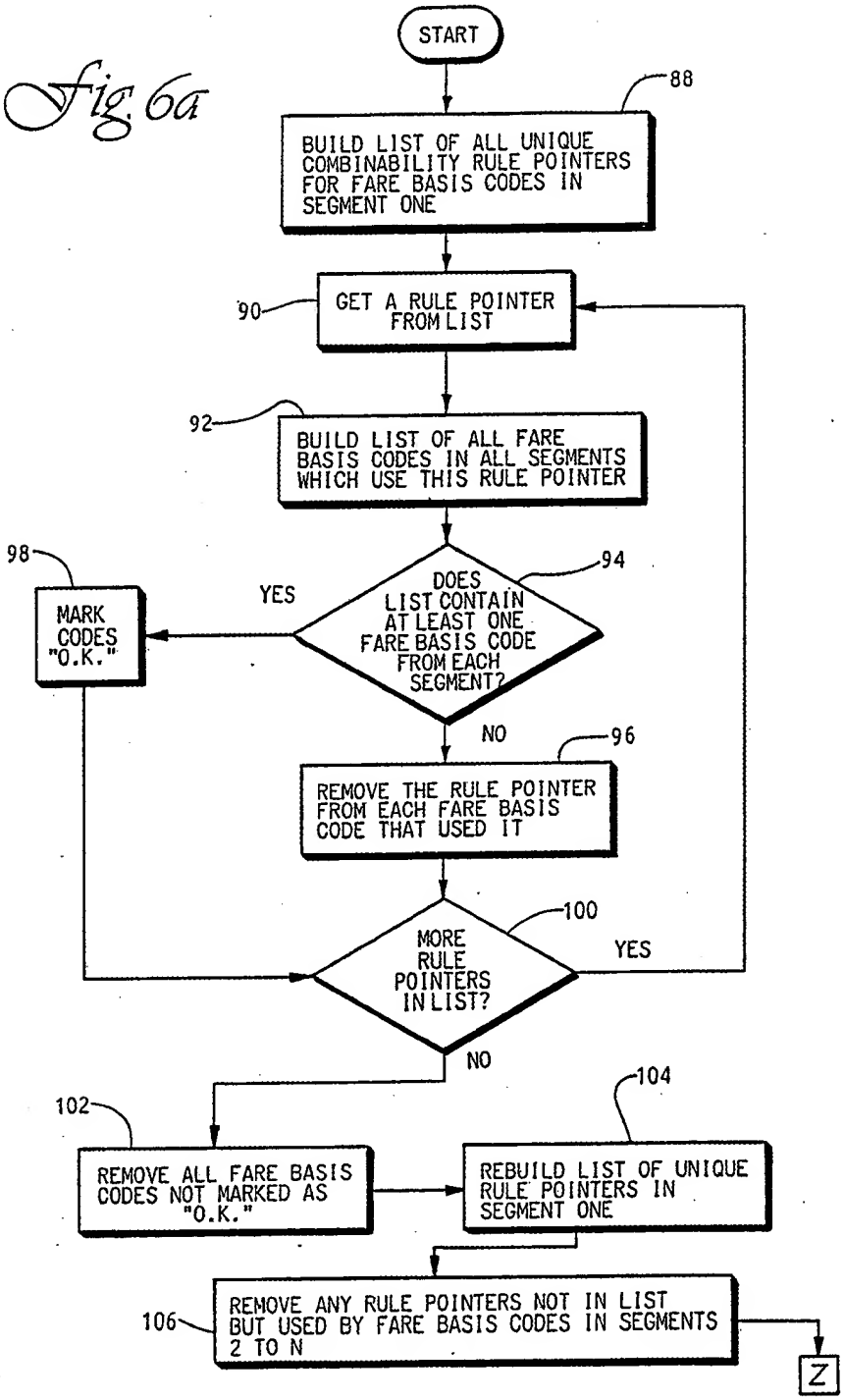
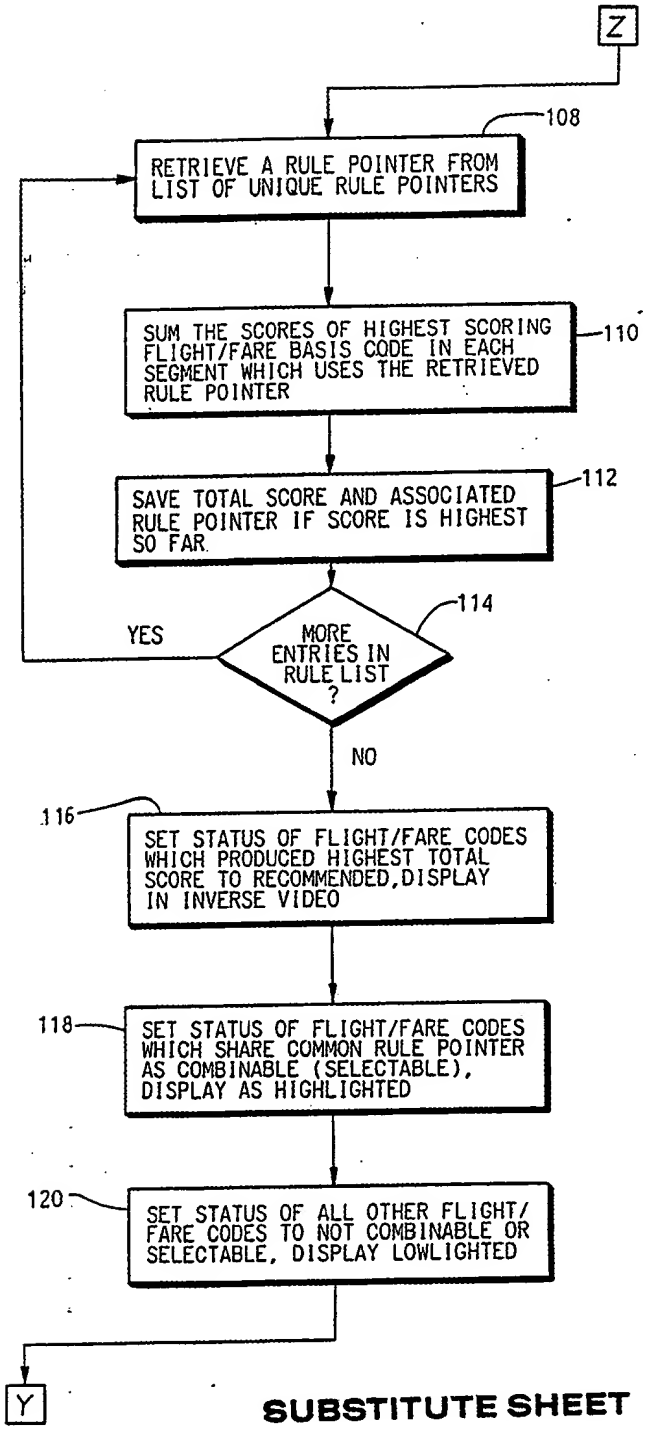

START
88
BUILD LIST OF ALL UNIQUE COMBINABILITY RULE POINTERS FOR FARE BASIS CODES IN SEGMENT ONE
90
GET A RULE POINTER FROM LIST
92
BUILD LIST OF ALL FARE BASIS CODES IN ALL SEGMENTS WHICH USE THIS RULE POINTER
94
DOES LIST CONTAIN AT LEAST ONE FARE BASIS CODE FROM EACH SEGMENT?
YES
98
MARK CODES "O.K."
NO
96
REMOVE THE RULE POINTER FROM EACH FARE BASIS CODE THAT USED IT
100
MORE RULE POINTERS IN LIST?
YES
NO
102
REMOVE ALL FARE BASIS CODES NOT MARKED AS "O.K."
104
REBUILD LIST OF UNIQUE RULE POINTERS IN SEGMENT ONE
106
REMOVE ANY RULE POINTERS NOT IN LIST BUT USED BY FARE BASIS CODES IN SEGMENTS 2 TO N
Z

Fig. 6b


Z
108
RETRIEVE A RULE POINTER FROM LIST OF UNIQUE RULE POINTERS
SUM THE SCORES OF HIGHEST SCORING FLIGHT/FARE BASIS CODE IN EACH SEGMENT WHICH USES THE RETRIEVED RULE POINTER
110
SAVE TOTAL SCORE AND ASSOCIATED RULE POINTER IF SCORE IS HIGHEST SO FAR
112
MORE ENTRIES IN RULE LIST ?
114
YES
NO
116
SET STATUS OF FLIGHT/FARE CODES WHICH PRODUCED HIGHEST TOTAL SCORE TO RECOMMENDED, DISPLAY IN INVERSE VIDEO
118
SET STATUS OF FLIGHT/FARE CODES WHICH SHARE COMMON RULE POINTER AS COMBINABLE (SELECTABLE), DISPLAY AS HIGHLIGHTED
120
SET STATUS OF ALL OTHER FLIGHT/FARE CODES TO NOT COMBINABLE OR SELECTABLE, DISPLAY LOWLIGHTED
Y

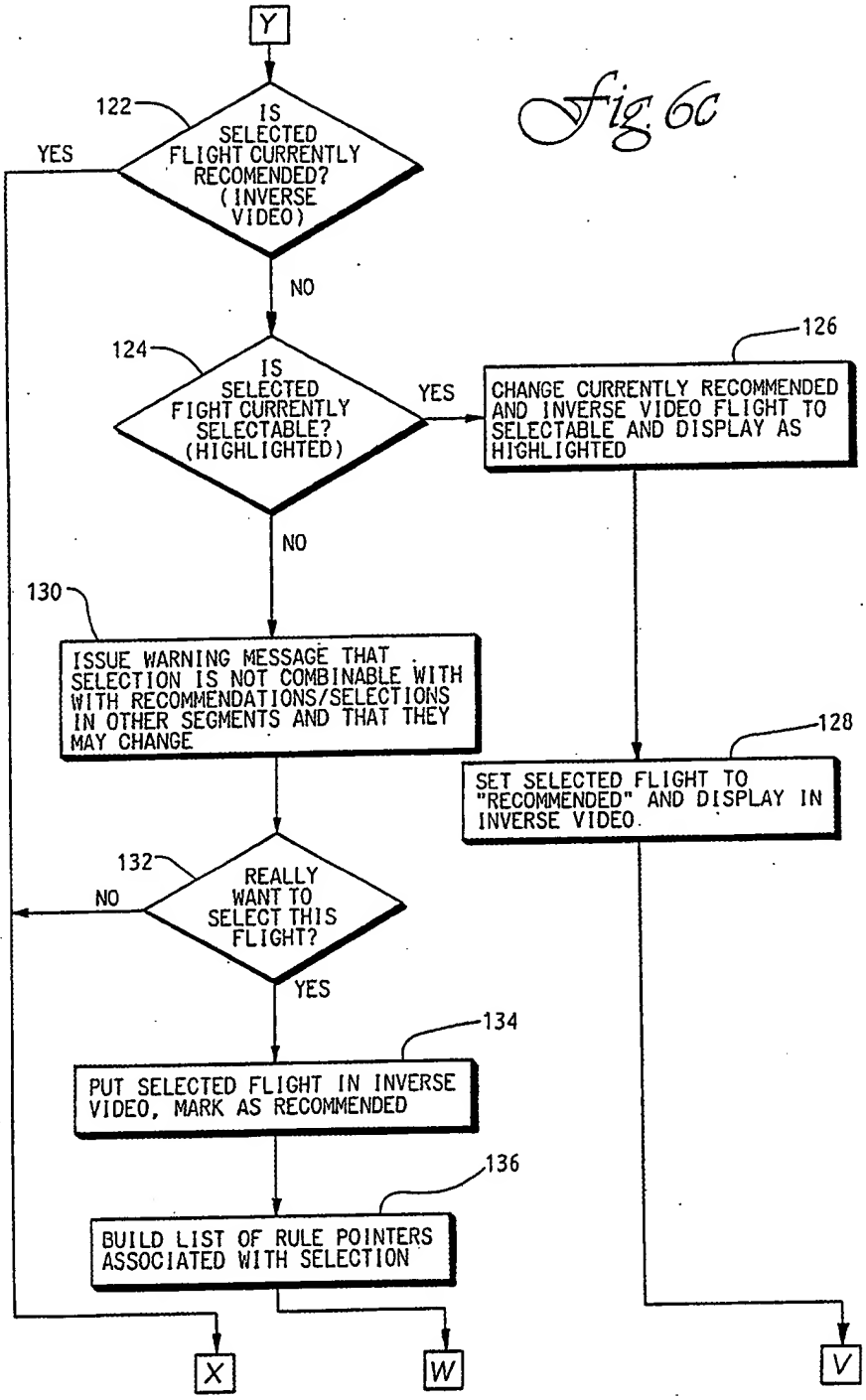

Y
122
IS SELECTED FLIGHT CURRENTLY RECOMENDED? (INVERSE VIDEO)
YES
NO
124
IS SELECTED FIGHT CURRENTLY SELECTABLE? (HIGHLIGHTED)
YES
126
CHANGE CURRENTLY RECOMMENDED AND INVERSE VIDEO FLIGHT TO SELECTABLE AND DISPLAY AS HIGHLIGHTED
NO
130
ISSUE WARNING MESSAGE THAT SELECTION IS NOT COMBINABLE WITH WITH RECOMMENDATIONS/SELECTIONS IN OTHER SEGMENTS AND THAT THEY MAY CHANGE
128
SET SELECTED FLIGHT TO "RECOMMENDED" AND DISPLAY IN INVERSE VIDEO
132
REALLY WANT TO SELECT THIS FLIGHT?
NO
YES
134
PUT SELECTED FLIGHT IN INVERSE VIDEO, MARK AS RECOMMENDED
136
BUILD LIST OF RULE POINTERS ASSOCIATED WITH SELECTION
X
W
V

Fig. 6C

Fig. 6d

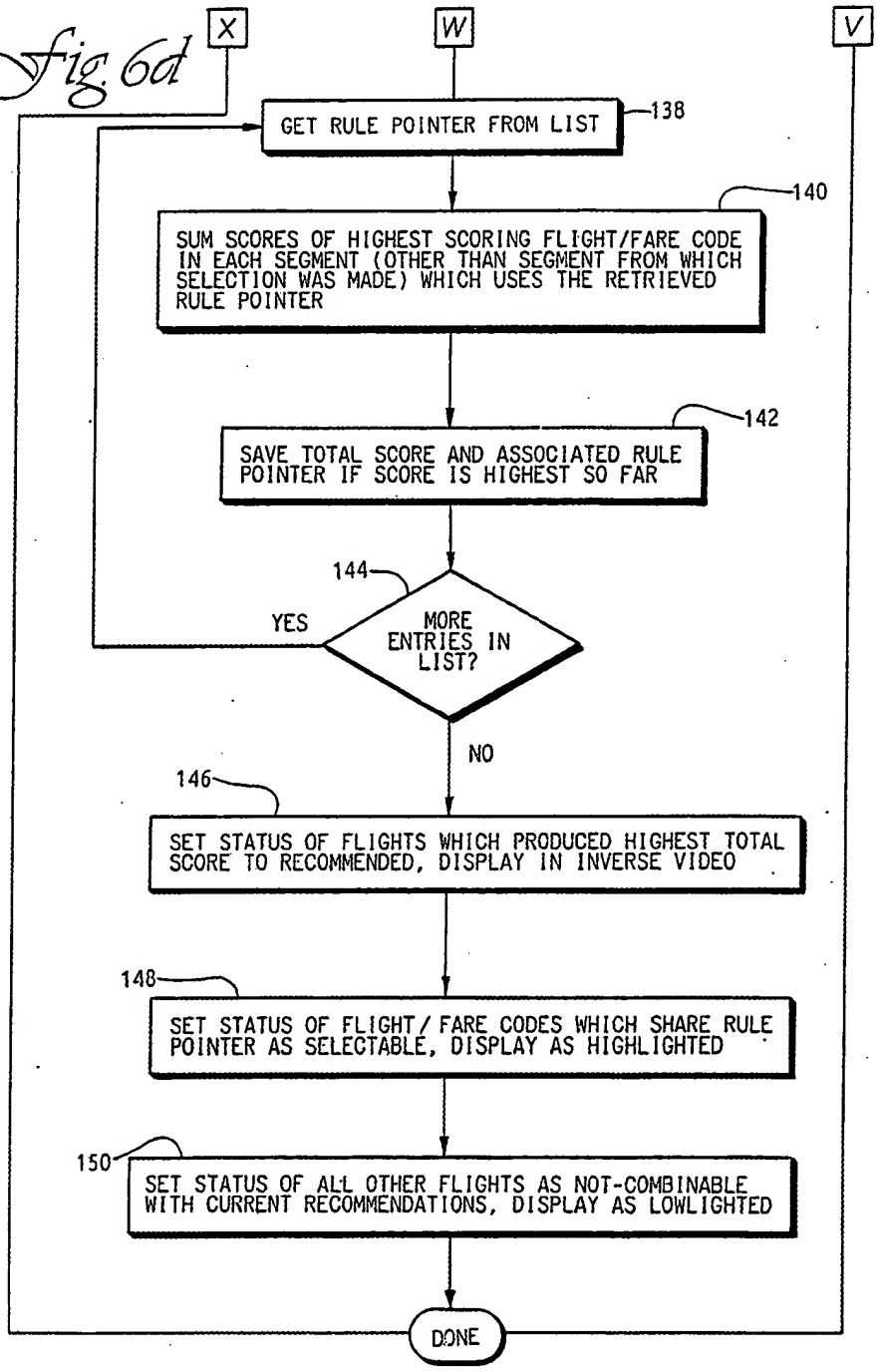

X
W
V
GET RULE POINTER FROM LIST
138
140
SUM SCORES OF HIGHEST SCORING FLIGHT/FARE CODE IN EACH SEGMENT (OTHER THAN SEGMENT FROM WHICH SELECTION WAS MADE) WHICH USES THE RETRIEVED RULE POINTER
142
SAVE TOTAL SCORE AND ASSOCIATED RULE POINTER IF SCORE IS HIGHEST SO FAR
144
MORE ENTRIES IN LIST?
YES
NO
146
SET STATUS OF FLIGHTS WHICH PRODUCED HIGHEST TOTAL SCORE TO RECOMMENDED, DISPLAY IN INVERSE VIDEO
148
SET STATUS OF FLIGHT/FARE CODES WHICH SHARE RULE POINTER AS SELECTABLE, DISPLAY AS HIGHLIGHTED
150
SET STATUS OF ALL OTHER FLIGHTS AS NOT-COMBINABLE WITH CURRENT RECOMMENDATIONS, DISPLAY AS LOWLIGHTED
DONE

Fig 7a

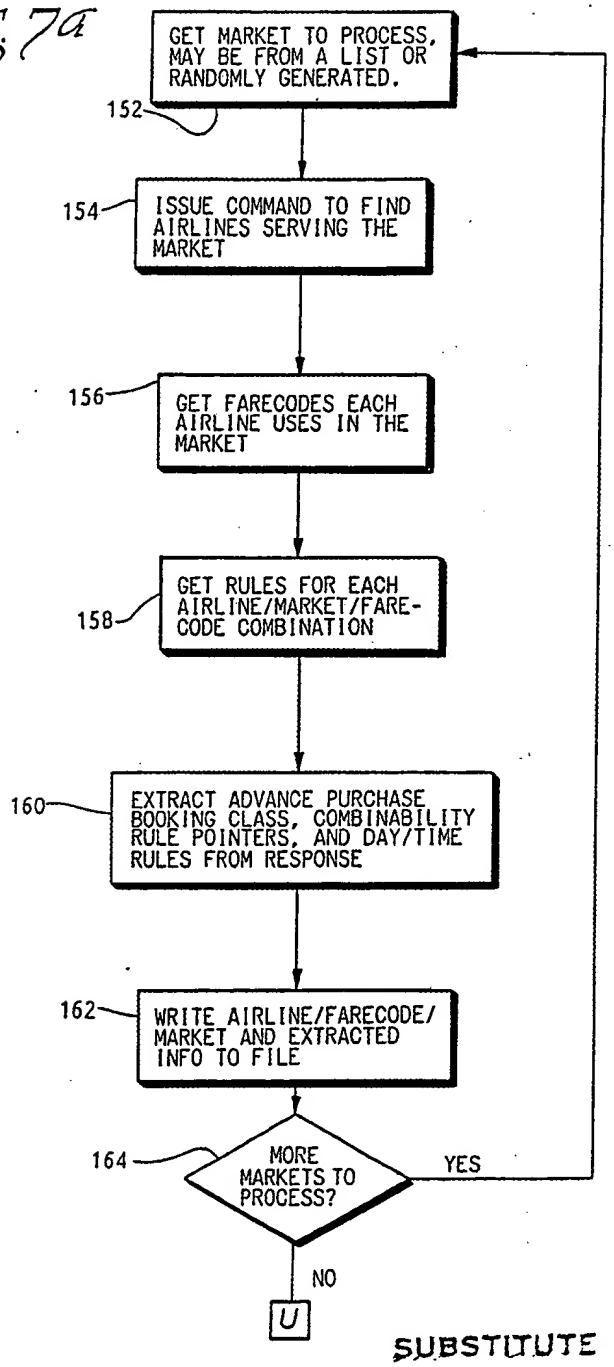
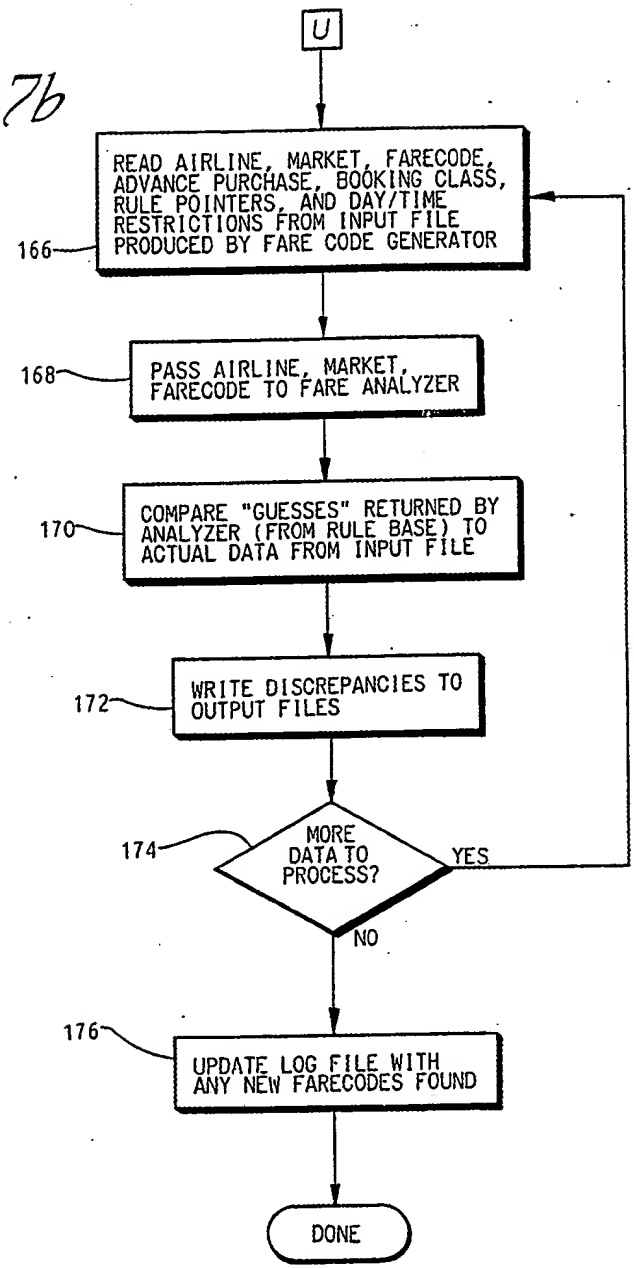

GET MARKET TO PROCESS, MAY BE FROM A LIST OR RANDOMLY GENERATED.
152
154
ISSUE COMMAND TO FIND AIRLINES SERVING THE MARKET
156
GET FARECODES EACH AIRLINE USES IN THE MARKET
158
GET RULES FOR EACH AIRLINE/MARKET/FARE-CODE COMBINATION
160
EXTRACT ADVANCE PURCHASE BOOKING CLASS, COMBINABILITY RULE POINTERS, AND DAY/TIME RULES FROM RESPONSE
162
WRITE AIRLINE/FARECODE/MARKET AND EXTRACTED INFO TO FILE
164
MORE MARKETS TO PROCESS?
YES
NO
U

Fig 7b


U
READ AIRLINE, MARKET, FARECODE, ADVANCE PURCHASE, BOOKING CLASS, RULE POINTERS, AND DAY/TIME RESTRICTIONS FROM INPUT FILE PRODUCED BY FARE CODE GENERATOR
166
PASS AIRLINE, MARKET, FARECODE TO FARE ANALYZER
168
COMPARE "GUESSES" RETURNED BY ANALYZER (FROM RULE BASE) TO ACTUAL DATA FROM INPUT FILE
170
WRITE DISCREPANCIES TO OUTPUT FILES
172
MORE DATA TO PROCESS?
174
YES
NO
UPDATE LOG FILE WITH ANY NEW FARECODES FOUND
176
DONE

INTERNATIONAL SEARCH REPORT

International Application No. PCT/US89/00684

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

G06F 15/22 ;G06F 15/20

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
U.S	364/407

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category *	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
Y	OAG Electronic Edition, Dialog Information Retrieval Service, 1986 January .	1-7
Y	Travel Weekly, Vol. 45 No. 92, 13 October 1986, Nadine Godwin "Agency, Funded by 3M, set to market software",	1-7
Y	Travel Weekly, Vol. 45, No. 93 23 October 1986, Nadine Godwin "Agency Dares to Launch Its Own Air Res System" .	1-7
Y	Proceedings of the Second Annual Artificial Intelligence and Advanced Computer Technology Conference, Tower Conference Manage., pp. 327-36, Abstract, 29 April - 1 May 1986, B. Wilson, "SEATS: an expert system to manage airline passenger discounts" .	1-7

* Special categories of cited documents: [10]

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
11 May 1989	06 JUN 1989
International Searching Authority	**Signature of Authorized Officer**
ISA/US	Gail O. Hayes

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